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COMPLETE SPECIFICATION

Process of producing Sponges of Gelatine and the like Proteins.

We, AKTIESELSKABET FERROSAN, of 72, Blegdamsvej, Copenhagen, Denmark, a Danish Company, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a process of producing sponges of gelatine and the like proteins.

It is well known to use resorbable sponges for absorbing and coagulating blood for instance in connection with surgical operations in order to avoid the drawbacks inherent in the removal of the normally employed gauze tampons from the wound cavity. Such resorbable sponges can be produced, for example from cellulose treated by oxidising agents, from fibrin, from fibrinogen or from gelatine.

Such resorbable sponges can be produced by dissolving common gelatine in water, adding a hardening agent, introducing air or a gas into the mixture, and thereafter drying the foamed mass. The dried mass is cut into pieces of suitable shape and size and sterilised.

In the practical employment of such gelatine sponges it is necessary to knead thoroughly with wet fingers or sterile gloves a suitable piece cut from the gelatine sponge, in order to soften the sponge and expel air from the pores thereof, so as to convert it into a state, in which it is capable of absorbing liquid. The sponge is then saturated with liquid, strongly compressed in order to expel the liquid again and placed in the cavity, from which it is desired to absorb liquid or where it is desired to promote coagulation of blood.

Gelatine sponges produced in the aforedescribed manner are deficient in certain respects. Thus the necessity of strongly kneading the dry sponge in order to convert it into a state in which it is capable of saturating itself with a liquid within a reasonable period of time, has proved a disadvantage.

The present invention aims at obviating the foregoing disadvantage.

To this end, the invention provides a process for the production of sponges for absorbing blood and other excretions which comprises dissolving gelatine or other proteins, which have no antigenetic (heterologous or shock-giving) action in water together with a hardening agent such as formaldehyde, introducing air or gas into the solution to foam the same, drying the foamed mass and incorporating with the protein mass at any time prior to drying, a surface- or interphase-active substance.

It has been found that a sponge produced in accordance with the invention not only is free from the foregoing disadvantage of the hitherto known sponges but also differs from said known sponges in a number of respects which renders it more readily employable.

Examples of proteins other than gelatine, which have no antigenetic (heterologous or shock-giving) action when used in the form of sponges for the treatment of human beings, are human proteins such as human plasma or human fibrinogen or de-antigenized animal proteins.

The process of the present invention yields a sponge, which is capable of absorbing liquid by simple squeezing under water so that it becomes full of liquid. This is an advantage as it saves work and time and is of great importance in the case of sterile materials since in that case care must be taken to subject the sterile sponge to as few manipulations as possible in order to avoid danger of infection.

Among the other advantages of the sponge produced according to the present invention may be mentioned that it is less brittle and can be more readily cut into suitable pieces. Moreover, it has the property that after being moistened and

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Price 4s 6d

compressed, it will remain in the compressed state until it comes into contact with a liquid, for instance when placed in position to absorb and coagulate blood or other excretions. In contradistinction thereto the known gelatine sponges after expulsion of liquid by compression, resume their original shape by filling their pores with air and consequently it is necessary when using these sponges, to keep the sponge pressed against the wound in order to avoid access of air to the pores and thereby to maintain the sponge in the form in which it is capable of serving its purpose.

Finally it may be mentioned that by using surface—or interphase—active substances it is possible to use only small amounts of hardening agent such as formaldehyde. The hardening will thus be less complete and the finished product will be more readily resorbable. In some cases where it is desired to increase the capability of the sponge to coagulate blood, coagulation-promoting substances may be added. Since gelatine is a substance which is suitable for supporting the growth of bacteria, it is generally preferable to use gelatine sponges containing substances having an antibacterial or growth-inhibiting action. If substances of this kind, which will not deteriorate at the high temperature used for the sterilisation are to be used they are added to the mass of gelatine in the form of a solution or incorporated in the mass by methods suiting their solubility, whereupon the mass is foamed and dried in the usual manner. If, however, the substances to be used are unstable to heat, the sterile sponge is washed before use, with sterile solutions of the antibacterial or growth-inhibiting substance.

The following Examples will serve to illustrate the invention:—

EXAMPLE I.

To a gelatine solution consisting of
50 grammes of gelatine and
200 grammes of water
are added
0.25 grammes of formaldehyde, and
0.5 grammes of sulphonated lauryl alcohol.

The mixture is then foamed and dried on trays at room temperature.

EXAMPLE II.

To a gelatine solution as described in Example I are added 0.25 grammes of p-amino-benzene-sulphonamido-thiazole after which the mixture is whipped and dried on trays at room temperature.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process for producing sponges for absorbing blood and other excretions which comprises dissolving gelatine or like proteins having no antigenetic (heterologous or shock-giving) action in water together with a hardening agent such as formaldehyde, introducing gas or air into the aqueous solution in order to foam the same, drying the foamed mass thus produced and incorporating a surface- or inter-phase-active substance with the protein at any time prior to the drying.

2. Process as claimed in Claim 1, in which a blood coagulant is also incorporated in the aqueous solution.

3. Process as claimed in Claim 1 or 2, in which an antibacterial or growth-inhibiting substance is also incorporated with the aqueous solution.

4. A process of producing sponges of gelatine and the like proteins, substantially as described with reference to the foregoing Examples.

5. Sponges of gelatine and the like proteins, whenever produced by the process claimed in any of the preceding claims.

Dated this 18th day of March, 1948.

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